

A REAL BREAKTHROUGH



Infrared Halogen Lamps

IN THERMOFORMING

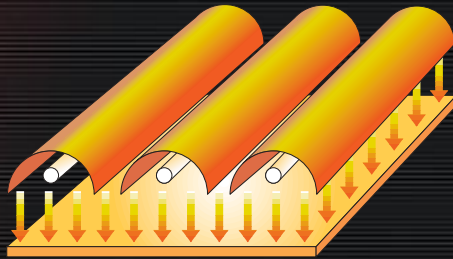
PHILIPS

Infrared Halogen Lamps

New properties in sheet processing, along with new thermoformable materials, drastically extend the range of products that can be formed. Thus, thermoforming allows much more creation and becomes a process of choice in plastics forming.

Several successive operations are carried out to eventually produce a formed part: clamping, heating, forming, cooling, and trimming. Heating appears to be the critical step: to thermoform a part as designed, the sheet has to be evenly heated at the proper temperature.

Heating is conventionally performed by means of medium wave (Quartz) or long wave (Ceramic) radiators, but the Philips Infrared Halogen Lamp is now providing a great improvement in heating process:



Infrared Halogen Lamps offer you, not only higher productivity, but also new benefits like versatility, safety, and, overall, energy saving!

A REAL
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1 Productivity

Efficiency

Infrared Halogen Lamps convert 90% of the emitted power into high efficient radiation, ensuring energy optimization in the equipment, and thus higher productivity.

For a given installed power, Infrared Halogen Lamps are more efficient as they create a higher irradiance at a given distance from the plastic sheet, compared to both Quartz and Ceramic. That's why Infrared Halogen Lamps require lower installed power to transmit the same level of heat at a given distance.

N.B.: A unique property of Infrared Halogen Lamps is to optically behave like light sources, making possible the use of a combined reflector (like the Philips' IR3) to control the focusing and gain in radiation output.

Infrared Halogen Lamps provide a more efficient heating!

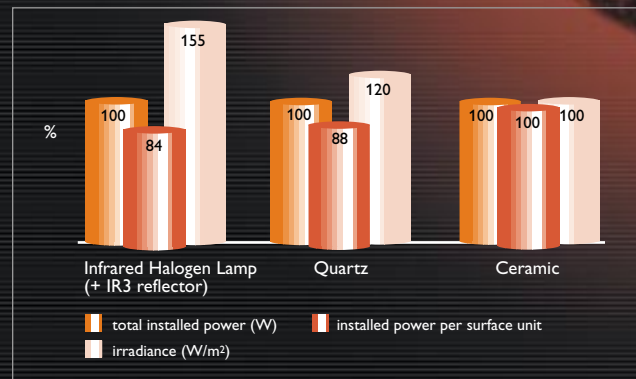


Figure 1
Efficiency comparison between Infrared Halogen Lamp, Quartz and Ceramic

2 Versatility

Philips' range of Infrared Halogen Lamps (and reflectors), available in different lengths and wattages, enables optimized combinations in the equipment for total controllability of the heating process.

If needed, thanks to their low thermal inertia, Infrared Halogen Lamps can be instantly adjusted to the optimized heat level by simple dimming. Adaptation to various kinds of shapes and colours is not a problem anymore: Infrared Halogen Lamps allow versatile operation by using only one piece of equipment. Of course the quality remains the same.

Furthermore, Infrared Halogen Lamps are 100% dimmable which allows a fine tuning of the process, and an accurate temperature cartography is therefore made possible as lamps can be individually power controlled to get an homogeneous irradiance distribution over the heated surface.

Infrared Halogen Lamps bring more accuracy and versatility in your process!

3 Safety

The low thermal inertia of Infrared Halogen Lamps allows very safe switching off procedure in case of emergency or process failure.

Heating stops immediately, there is no need to move

away the heating elements from the line to protect either workers, machines, or products.

Infrared Halogen Lamps make the process safer!

4 Energy saving

Infrared Halogen Lamps cut heating and cooling times. Instant responsiveness of Philips Halogen Lamps provides the possibility to switch off the working unit in case of discontinuous process.

Thanks to the higher efficiency of Infrared Halogen Lamps, less installed power is required to eventually obtain the same temperature on the material as with Quartz or Ceramic radiators. Therefore, energy consumption can significantly be reduced and, the total saving can be up to 25 % (for dark plastics).

Infrared Halogen Lamps allow energy saving!

To improve and optimize your heating process, to save time and energy, use Philips Infrared Halogen Lamps!

Philips Lighting is able to advise users on the most efficient solution to meet individual requirements, based on its experience in this field.

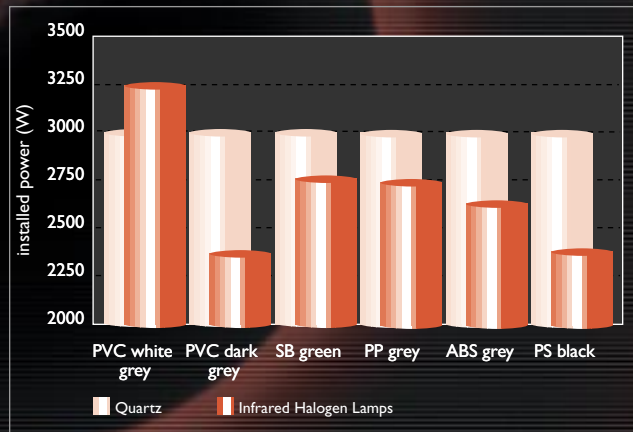


Figure 4

Required installed power to reach the same top temperature on the plastic sheet after 60 s

N.B.: With whiter polymers, infrared radiation is likely to be more reflected, thus a slight heating time increase could be required to eventually obtain the right temperature.

For further information, you can either:

- contact your local Philips Lighting Organisation or
- visit us on <http://www.infrared.philips.com>



Time of response

Although it takes minutes for Quartz and Ceramic radiators to reach their operating output, Infrared Halogen Lamps (short wave emitter) only require a few seconds to get the same level of energy.

Infrared Halogen Lamps reduce cycle time, and allow higher process speed!

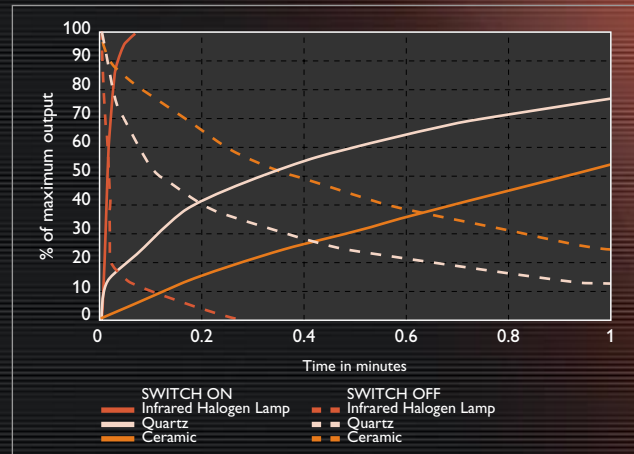


Figure 2

Compared times of response between Infrared Halogen Lamp, Quartz and Ceramic

THROUGH THERMOFORMING

Homogeneity

As shown beside, the process efficiency is reinforced by the fact that Infrared Halogen Lamps give in most cases a better temperature gradient over the plastic thickness. This is due to short wave radiation, unique feature of Infrared Halogen Lamps, that has been shown to be more penetrating than long wave or even medium wave radiation.

Additionally, absorption depends on the colour of the plastic: the darker the plastic, the higher the efficiency.

N.B.: The possibility of using an external reflector can contribute to smooth out the heat beam pattern and optimize the temperature distribution.

Infrared Halogen Lamps enhance temperature homogeneity!

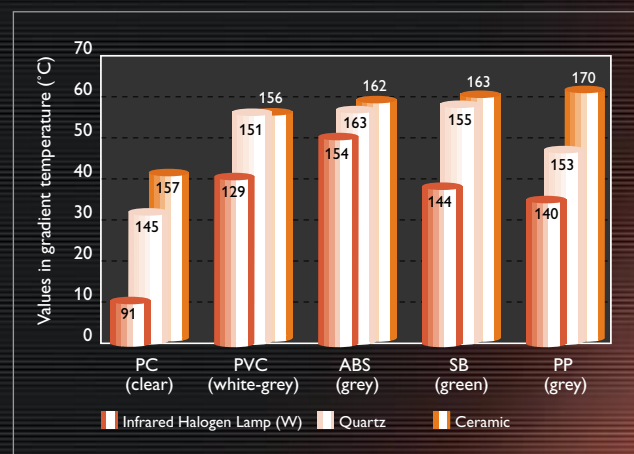


Figure 3

Compared temperature gradient over different plastic sheets (3 mm thick), receiving the same irradiance during 60 s (top surface temperatures are also indicated)